

Application No. 10/750,427
Amendment Dated 6/25/09
Reply to Office Action of 2/25/09

This listing of claims will replace all prior versions, and listings, of claims in the application:

In the Claims:

1-8. (CANCELED).

9. (CURRENTLY AMENDED) A method for performing a filling sequence in a contrast media injector system that uses a fill tube coupling a syringe to contrast media supply to fill the syringe with a desired fill volume of contrast media, the method comprising:

attaching said fill tube to said syringe;

drawing contrast media into the syringe through the fill tube at a first fill rate;

thereafter, automatically expelling substantially all air from the fill tube by automatically reversing the fill rate and expelling fluid from said syringe, wherein at least some of the contrast media is expelled through the fill tube during the expelling;

thereafter, filling the syringe at a second fill rate to fill the syringe with the desired fill volume of contrast media, wherein the second fill rate is faster than the first fill rate; and

thereafter, injecting contrast media into a patient.

10. (PREVIOUSLY PRESENTED) The method according to claim 9 wherein the drawing comprises drawing a first amount of contrast media into the syringe, and the

Application No. 10/750,427
Amendment Dated 6/25/09
Reply to Office Action of 2/25/09

expelling comprises expelling substantially all of the first amount of contrast media out of the syringe.

11. (PREVIOUSLY PRESENTED) The method according to claim 9, wherein the expelling comprises expelling substantially all air from the syringe.

12. (PREVIOUSLY PRESENTED) A method for changing contrast media containers during a syringe filling sequence, the method comprising:

attaching a fill tube to a syringe;

thereafter, filling a syringe at at least one of a first fill rate and a second fill rate through the fill tube, the fill tube coupled between the syringe and a first contrast container;

thereafter, pausing the filling when the first contrast container is substantially emptied;

thereafter, replacing the first contrast container with a second contrast container;

thereafter, coupling the fill tube between the syringe and the second contrast container;

thereafter, expelling substantially all air from the fill tube coupled between the syringe and the second contrast container wherein at least some of the contrast media is expelled from the syringe, through the fill tube, and into the second contrast container during the expelling; and

Application No. 10/750,427
Amendment Dated 6/25/09
Reply to Office Action of 2/25/09

thereafter, resuming filling the syringe from the second contrast container at the second fill rate that is faster than the first fill rate.

13. (PREVIOUSLY PRESENTED) The method according to claim 12 wherein the step of expelling comprises:

expelling a portion of contrast media that was acquired from the first contrast container out of the syringe through the fill tube and into the second contrast container.

14. (PREVIOUSLY PRESENTED) The method according to claim 12, wherein the expelling comprises expelling substantially all air from the syringe.

15. (PREVIOUSLY PRESENTED) The method according to claim 9, wherein the expelling is performed by the contrast media injector automatically under control of control circuitry of the injector.

16. (PREVIOUSLY PRESENTED) The method according to claim 9, wherein the filling is performed by the contrast media injector automatically under control of control circuitry of the injector.

17. (PREVIOUSLY PRESENTED) The method according to claim 9, wherein the

Application No. 10/750,427
Amendment Dated 6/25/09
Reply to Office Action of 2/25/09

expelling and the filling are performed by the contrast media injector automatically under control of control circuitry of the injector.

18. (PRESENTLY AMENDED) A ~~method of operation~~ for a contrast media injector system implementing an automatic filling process, the ~~method~~ automatic filling process comprising [[:]] an automatically executed sequence of plunger movements performed after an operator coupling couples a fill tube to a syringe of a contrast media injector system [[,:]], the plunger movements comprising, in sequence:

~~thereafter~~, drawing medical fluid into the syringe of the contrast media injector system at a first fill rate;

after the drawing, expelling at least some of the medical fluid from the syringe; and

thereafter, filling the syringe via the fill tube,
wherein the drawing and expelling are sequentially followed by the filling, are automated and the filling is performed to fill the syringe with a desired amount of fluid identified by the operator in accordance with programming of the contrast media injector system.

19. (PRESENTLY AMENDED) The ~~method~~ contrast media injector system of claim 18, wherein the first fill rate is a rate sufficient to avoid aeration of the medical fluid.

Application No. 10/750,427
Amendment Dated 6/25/09
Reply to Office Action of 2/25/09

20. (PRESENTLY AMENDED) The method contrast media injector system of claim 18, wherein the drawing comprises drawing at least 20 ml of the medical fluid into the syringe.

21. (PRESENTLY AMENDED) The method contrast media injector system of claim 18, wherein the drawing comprises drawing medical fluid through a fill tube and into the syringe.

22. (CANCELED)

23. (PRESENTLY AMENDED) The method contrast media injector system of claim 18, wherein the filling comprises filling the syringe with a preprogrammed volume of the medical fluid.

24. (CANCELED)

25. (PREVIOUSLY PRESENTED) The method of claim 9, wherein the syringe is oriented such that a discharge tip of the syringe is positioned above a barrel of the syringe during the drawing, the expelling, and the filling.

Application No. 10/750,427
Amendment Dated 6/25/09
Reply to Office Action of 2/25/09

26. (PREVIOUSLY PRESENTED) The method of claim 12, wherein the syringe is oriented such that a discharge tip of the syringe is positioned above a barrel of the syringe during the filling, the expelling, and the resuming.

27. (CURRENTLY AMENDED) The ~~method~~ contrast media injector system of claim 18, wherein the syringe is oriented such that a discharge tip of the syringe is positioned above a barrel of the syringe during the drawing, the expelling, and the filling.

28. (PREVIOUSLY PRESENTED) The method of claim 9, wherein both air and contrast media are expelled through a discharge tip of the syringe during the expelling.

29. (PREVIOUSLY PRESENTED) The method of claim 12, wherein both air and contrast media are expelled through a discharge tip of the syringe during the expelling.

30. (CURRENTLY AMENDED) The ~~method~~ contrast media injector system of claim 18, wherein both air and contrast media are expelled through a discharge tip of the syringe during the expelling.

31. (CURRENTLY AMENDED) The ~~method~~ contrast media injector system of claim 27, wherein both air and contrast media are expelled through a discharge tip of the syringe during the expelling.

32. (CURRENTLY AMENDED) A method of operation for a contrast media injector system, the method comprising:

automatically drawing an initial volume of medical fluid into a syringe of a contrast media injector system at a first fill rate;

after the drawing, automatically ceasing drawing and commencing expelling at least some of the medical fluid from the syringe; and

thereafter, automatically ceasing expelling and commencing filling the syringe at a second fill rate that is faster than the first fill rate, wherein a total volume of medical fluid in the syringe after the filling is greater than the initial volume.

33. (PREVIOUSLY PRESENTED) The method of claim 32, wherein the first fill rate is a rate sufficient to avoid aeration of the medical fluid.

34. (PREVIOUSLY PRESENTED) The method of claim 32, wherein the drawing comprises drawing at least 20 ml of the medical fluid into the syringe.

35. (PREVIOUSLY PRESENTED) The method of claim 32, wherein the drawing comprises drawing medical fluid through a fill tube and into the syringe.

Application No. 10/750,427
Amendment Dated 6/25/09
Reply to Office Action of 2/25/09

36. (PREVIOUSLY PRESENTED) The method of claim 32, wherein the syringe is oriented such that a discharge tip of the syringe is positioned above a barrel of the syringe during the drawing, the expelling, and the filling.

37. (PREVIOUSLY PRESENTED) The method of claim 32, wherein both air and contrast media are expelled through a discharge tip of the syringe during the expelling.

38. A method of performing an automated syringe filling sequence in a contrast media injector, the method comprising:

the injector pulling a first amount of fluid into a syringe of the injector at a first rate;

after the injector pulling the first amount of fluid into the syringe, the injector automatically reversing a direction of a ram of the injector to expel at least a portion of the fluid from the syringe; and

after the injector automatically reversing the direction of the ram, the injector automatically retracting the ram at a second rate faster than the first rate to draw a second volume of the fluid into the syringe.

39. The method of claim 38, wherein the first rate is slow enough so as not to aerate the fluid.

Application No. 10/750,427
Amendment Dated 6/25/09
Reply to Office Action of 2/25/09

40. The method of claim 39, wherein the first volume is a volume sufficient to be visibly noticed by an operator of the injector.
41. The method of claim 38, wherein the first volume is a volume sufficient to be visibly noticed by an operator of the injector.
42. The method of claim 41, wherein the first volume is at least about 20 ml.
43. The method of claim 40, wherein the first volume is at least about 20 ml.
44. The method of claim 39, wherein the first volume is at least about 20 ml.
45. The method of claim 38, wherein the first volume is at least about 20 ml.
46. The method of claim 45, wherein all air is expelled from the syringe upon completion of the injector automatically reversing the direction of the ram to expel at least a portion of the fluid from the syringe.
47. The method of claim 44, wherein all air is expelled from the syringe upon completion of the injector automatically reversing the direction of the ram to expel at least a portion of the fluid from the syringe.

48. The method of claim 43, wherein all air is expelled from the syringe upon completion of the injector automatically reversing the direction of the ram to expel at least a portion of the fluid from the syringe.
49. The method of claim 42, wherein all air is expelled from the syringe upon completion of the injector automatically reversing the direction of the ram to expel at least a portion of the fluid from the syringe.
50. The method of claim 41, wherein all air is expelled from the syringe upon completion of the injector automatically reversing the direction of the ram to expel at least a portion of the fluid from the syringe.
51. The method of claim 40, wherein all air is expelled from the syringe upon completion of the injector automatically reversing the direction of the ram to expel at least a portion of the fluid from the syringe.
52. The method of claim 39, wherein all air is expelled from the syringe upon completion of the injector automatically reversing the direction of the ram to expel at least a portion of the fluid from the syringe.

Application No. 10/750,427
Amendment Dated 6/25/09
Reply to Office Action of 2/25/09

53. The method of claim 38, wherein all air is expelled from the syringe upon completion of the injector automatically reversing the direction of the ram to expel at least a portion of the fluid from the syringe.

54. The method of claim 53, wherein a volume of fluid in the syringe upon completion of the injector automatically retracting the ram is a desired fill volume entered into the injector by an operator of the injector prior to the injector pulling the first amount of fluid into the syringe.

55. The method of claim 52, wherein a volume of fluid in the syringe upon completion of the injector automatically retracting the ram is a desired fill volume entered into the injector by an operator of the injector prior to the injector pulling the first amount of fluid into the syringe.

56. The method of claim 51, wherein a volume of fluid in the syringe upon completion of the injector automatically retracting the ram is a desired fill volume entered into the injector by an operator of the injector prior to the injector pulling the first amount of fluid into the syringe.

57. The method of claim 50, wherein a volume of fluid in the syringe upon completion of the injector automatically retracting the ram is a desired fill volume entered into the

injector by an operator of the injector prior to the injector pulling the first amount of fluid into the syringe.

58. The method of claim 49, wherein a volume of fluid in the syringe upon completion of the injector automatically retracting the ram is a desired fill volume entered into the injector by an operator of the injector prior to the injector pulling the first amount of fluid into the syringe.

59. The method of claim 48, wherein a volume of fluid in the syringe upon completion of the injector automatically retracting the ram is a desired fill volume entered into the injector by an operator of the injector prior to the injector pulling the first amount of fluid into the syringe.

60. The method of claim 47, wherein a volume of fluid in the syringe upon completion of the injector automatically retracting the ram is a desired fill volume entered into the injector by an operator of the injector prior to the injector pulling the first amount of fluid into the syringe.

61. The method of claim 46, wherein a volume of fluid in the syringe upon completion of the injector automatically retracting the ram is a desired fill volume entered into the

Application No. 10/750,427
Amendment Dated 6/25/09
Reply to Office Action of 2/25/09

injector by an operator of the injector prior to the injector pulling the first amount of fluid into the syringe.

62. The method of claim 45, wherein a volume of fluid in the syringe upon completion of the injector automatically retracting the ram is a desired fill volume entered into the injector by an operator of the injector prior to the injector pulling the first amount of fluid into the syringe.

63. The method of claim 44, wherein a volume of fluid in the syringe upon completion of the injector automatically retracting the ram is a desired fill volume entered into the injector by an operator of the injector prior to the injector pulling the first amount of fluid into the syringe.

64. The method of claim 43, wherein a volume of fluid in the syringe upon completion of the injector automatically retracting the ram is a desired fill volume entered into the injector by an operator of the injector prior to the injector pulling the first amount of fluid into the syringe.

65. The method of claim 42, wherein a volume of fluid in the syringe upon completion of the injector automatically retracting the ram is a desired fill volume entered into the

injector by an operator of the injector prior to the injector pulling the first amount of fluid into the syringe.

66. The method of claim 41, wherein a volume of fluid in the syringe upon completion of the injector automatically retracting the ram is a desired fill volume entered into the injector by an operator of the injector prior to the injector pulling the first amount of fluid into the syringe.

67. The method of claim 40, wherein a volume of fluid in the syringe upon completion of the injector automatically retracting the ram is a desired fill volume entered into the injector by an operator of the injector prior to the injector pulling the first amount of fluid into the syringe.

68. The method of claim 39, wherein a volume of fluid in the syringe upon completion of the injector automatically retracting the ram is a desired fill volume entered into the injector by an operator of the injector prior to the injector pulling the first amount of fluid into the syringe.

69. The method of claim 38, wherein a volume of fluid in the syringe upon completion of the injector automatically retracting the ram is a desired fill volume entered into the

Application No. 10/750,427
Amendment Dated 6/25/09
Reply to Office Action of 2/25/09

injector by an operator of the injector prior to the injector pulling the first amount of fluid into the syringe.

70. The method of claim 38, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;

the injector automatically reversing the direction of the ram; and

the injector automatically retracting the ram.

71. The method of claim 39, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;

the injector automatically reversing the direction of the ram; and

the injector automatically retracting the ram.

72. The method of claim 40, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;

the injector automatically reversing the direction of the ram; and

the injector automatically retracting the ram.

Application No. 10/750,427
Amendment Dated 6/25/09
Reply to Office Action of 2/25/09

73. The method of claim 41, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;

the injector automatically reversing the direction of the ram; and

the injector automatically retracting the ram.

74. The method of claim 42, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;

the injector automatically reversing the direction of the ram; and

the injector automatically retracting the ram.

75. The method of claim 43, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;

the injector automatically reversing the direction of the ram; and

the injector automatically retracting the ram.

76. The method of claim 44, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;

the injector automatically reversing the direction of the ram; and
the injector automatically retracting the ram.

77. The method of claim 45, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;
the injector automatically reversing the direction of the ram; and
the injector automatically retracting the ram.

78. The method of claim 46, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;
the injector automatically reversing the direction of the ram; and
the injector automatically retracting the ram.

79. The method of claim 47, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;
the injector automatically reversing the direction of the ram; and
the injector automatically retracting the ram.

Application No. 10/750,427
Amendment Dated 6/25/09
Reply to Office Action of 2/25/09

80. The method of claim 48, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;

the injector automatically reversing the direction of the ram; and

the injector automatically retracting the ram.

81. The method of claim 49, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;

the injector automatically reversing the direction of the ram; and

the injector automatically retracting the ram.

82. The method of claim 50, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;

the injector automatically reversing the direction of the ram; and

the injector automatically retracting the ram.

83. The method of claim 51, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;

the injector automatically reversing the direction of the ram; and
the injector automatically retracting the ram.

84. The method of claim 52, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;
the injector automatically reversing the direction of the ram; and
the injector automatically retracting the ram.

85. The method of claim 53, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;
the injector automatically reversing the direction of the ram; and
the injector automatically retracting the ram.

86. The method of claim 54, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;
the injector automatically reversing the direction of the ram; and
the injector automatically retracting the ram.

Application No. 10/750,427
Amendment Dated 6/25/09
Reply to Office Action of 2/25/09

87. The method of claim 55, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;

the injector automatically reversing the direction of the ram; and

the injector automatically retracting the ram.

88. The method of claim 56, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;

the injector automatically reversing the direction of the ram; and

the injector automatically retracting the ram.

89. The method of claim 57, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;

the injector automatically reversing the direction of the ram; and

the injector automatically retracting the ram.

90. The method of claim 58, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;

the injector automatically reversing the direction of the ram; and
the injector automatically retracting the ram.

91. The method of claim 59, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;
the injector automatically reversing the direction of the ram; and
the injector automatically retracting the ram.

92. The method of claim 60, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;
the injector automatically reversing the direction of the ram; and
the injector automatically retracting the ram.

93. The method of claim 61, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;
the injector automatically reversing the direction of the ram; and
the injector automatically retracting the ram.

Application No. 10/750,427
Amendment Dated 6/25/09
Reply to Office Action of 2/25/09

94. The method of claim 62, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;

the injector automatically reversing the direction of the ram; and

the injector automatically retracting the ram.

95. The method of claim 63, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;

the injector automatically reversing the direction of the ram; and

the injector automatically retracting the ram.

96. The method of claim 64, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;

the injector automatically reversing the direction of the ram; and

the injector automatically retracting the ram.

97. The method of claim 65, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;

the injector automatically reversing the direction of the ram; and
the injector automatically retracting the ram.

98. The method of claim 66, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;
the injector automatically reversing the direction of the ram; and
the injector automatically retracting the ram.

99. The method of claim 67, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;
the injector automatically reversing the direction of the ram; and
the injector automatically retracting the ram.

100. The method of claim 68, wherein the injector is designed such that the syringe is pointing substantially upward during:

the injector pulling the first amount of the fluid into the syringe;
the injector automatically reversing the direction of the ram; and
the injector automatically retracting the ram.

Application No. 10/750,427
Amendment Dated 6/25/09
Reply to Office Action of 2/25/09

101. The method of claim 69, wherein the injector is designed such that the syringe is pointing substantially upward during:
the injector pulling the first amount of the fluid into the syringe;
the injector automatically reversing the direction of the ram; and
the injector automatically retracting the ram.